WTI Part No.: 13132
Rev. A

SRM-100

Secure Rack Modem

AT Command Reference Guide; Rockwell Format Modems

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1. Introduction

The SRM-100 Secure Rack Modem is designed for applications that require secure, dial-up access to console ports on rack mounted equipment. WTI's Secure Rack Modem can recognize up to 100 passwords, track activity for each password and create a log record of successful and/or unsuccessful access attempts.

In addition to the SRM's Menu Driven configuration functions, the internal modem will also accept AT commands. This document describes the AT command set for Rockwell format modems, and lists the function of each command.

If necessary, the AT command can be used to select advanced modem configuration parameters, some of which may not be available via the SRM's menuing system. AT commands can be sent directly to the modem, or added to the user defined initialization string via the SRM's Modem Parameters menu.

> **Note:** For information on general SRM-100 installation, configuration, and operation procedures, please refer to the SRM-100 User's Guide (WTI P/N 13051).

About this Document

This document describes the AT Command Set, S-Register configuration, and Modem Response Codes for all SRM-100 units that include the Rockwell format modem. Depending on when you purchased your SRM, it may include either a Rockwell format modem or a Multi-Tech format modem.

In order to determine which modem is included in your SRM unit, please refer to the SRM-100 Help Screen (/H); locate the field that lists the Modem Type, and then refer to the table below.

Listed Modem Type	Modem Format
V.2000-V34_ACF_DP1	Rockwell Format
MT2834ZPX	Multi-Tech Format

2. Communicating with the Internal Modem

In order to invoke AT commands, you must communicate directly with the SRM's internal modem. The Modem Command mode is only available via the Console Port or the serial modem port; inbound callers cannot communicate *directly* with the modem. To send AT commands to the SRM's internal modem proceed as follows:

1. **Via Console Port:** Access the SRM command Mode as described in Section 5.1.1 in the SRM-100 User's Guide.

   a) When the "SRM>" command prompt appears, type **/U** and press **[Enter]** to display the SRM Utilities Screen.

   b) When the Utilities Screen appears, type **8** and press **[Enter]** to activate the Pass-Through mode. When the Pass-Through Mode is active, the device connected to the Console Port can send AT commands directly to the SRM's internal modem.

   c) To exit the Pass-Through Mode, type **/X** and press **[Enter]**, the unit will return to the "SRM>" command prompt.

2. **Via Modem Port:** The device connected to the SRM's Modem Port can also issue AT commands. Go to the secure device and start your communications program (e.g. ProComm). Make certain that the communications program is configured to use the same COM port that is connected to the SRM.

3. Modem Status

The SRM's internal modem can generate a status screen, which lists currently selected settings for most of the AT commands, the contents of most of the S-Registers, the two stored modem profiles, and four stored phone numbers.

To display the modem status screen, access the internal modem's command mode (as described in Section 9.1, in the SRM-100 User's Guide), then type **AT&V** and press **[Enter]**. The internal modem will display the status screen shown in Figure 1 below.

```
ACTIVE PROFILE
B1 E0 L1 M1 N1 Q1 T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0 &Y0
S00:001 S01:000 S02:043 S03:013 S04:010 S05:008 S06:002 S07:050 S08:002 S09:006
S10:014 S11:095 S12:050 S18:000 S25:005 S26:001 S36:007 S37:000 S38:020 S44:020
S46:138 S48:007 S95:000

STORED PROFILE 0
B1 E1 L1 M1 N1 Q0 T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000
S36:007 S37:000 S40:104 S41:195 S46:138 S95:000

STORED PROFILE 1
B1 E1 L1 M1 N1 Q0 T V1 W0 X4 Y0 &C1 &D2 &G0 &J0 &K3 &Q5 &R1 &S0 &T5 &X0
S00:000 S02:043 S06:002 S07:050 S08:002 S09:006 S10:014 S11:095 S12:050 S18:000
S36:007 S37:000 S40:104 S41:195 S46:138 S95:000

TELEPHONE NUMBERS
0=                                      1=
2=                                      3=
```

Figure 1: The Modem Status Screen (Defaults Shown)

4. AT Command Set

This section describes the AT command set. Note the following:

- Type commands in either upper or lower case. Do not use a combination of upper *and* lower case characters.
- Use the Backspace key to delete errors.
- Some commands have numeric options. If these commands are invoked *without* a numeric option, the modem will assume option 0 (zero). For example, when the command **ATE** is invoked, the modem will assume command **ATE0** was intended.
- All commands begin with the **AT** prefix, and are invoked by pressing **[Enter]** (Carriage Return). The only exceptions are the **A/** command (Repeat previous command) and **+++** (Exit to on-line command mode).
- The maximum command length is 40 characters. This does not include the **AT** prefix, Carriage Returns, or spaces.
- Defaults are marked with an asterisk (*).

Command	Function/Options
AT	Attention Command. Required prefix for all modem commands. Not required for the A/ command or +++ command.
A/	Re-execute Last Command. Used mainly to redial. Does not require the AT prefix or a Carriage Return.
A	Manual Answer. Goes off hook in answer mode.
B*n*	CCITT or Bell Operation B0 Selects CCITT operation at 300 or 1200 bps. * B1 Selects Bell operation at 300 or 1200 bps.
C*n*	Transmit Carrier Signal C0 Not Supported. C1 Enable Transmit Carrier Signal.

Command	Function/Options
D*n*	Dial Command. Dials the specified phone number. Can also include the following command options:
	* Dials the "star" digit (tone dialing only).
	# Dials the "pound" digit (tone dialing only).
	L Re-dials last number dialed
	P Pulse (Rotary) Dial Mode. 10 pulses per second.
	T Tone Dial Mode (DTMF).
	W Wait for dial tone (1 to 255 seconds, Default = 50 sec.)
	, (Comma) Pause. Modem will pause for time period specified by register S8 before dialing (0 to 255 seconds, Default = 2 sec.)
	@ Wait for quiet answer.
	! (Exclamation Point) Flashes the switch hook.
	; (Semicolon) Return to Command Mode after dialing.
	& Wait for credit card dial tone before continuing with dial string. If the bong is not detected within the time specified by register S7, the modem will abort the dial sequence, go on-hook, and generate an error message.
	^ Toggles calling tone for current dial attempt only.
	S=*n* Dial stored number (where *n* = 0 to 3).
	( ) (Parentheses) Ignored; may be used to format the dial string.
	- (Dash) Ignored; may be used to format the dial string.
	<Space> Ignored; may be used to format the dial string.
E*n*	Set Local Echo.
	* E0 Disable echoing of commands to screen.
	E1 Enable echoing of commands to screen.
H*n*	Disconnect (Hang-Up)
	H0 Hangs Up (goes on-hook).
	H1 Goes off-hook.
I*n*	Modem Identification
	I0 Display product identification code.
	I1 Display checksum.
	I2 Display ROM checksum as OK or ERROR.
	I3 Display modem firmware revision level.
	I6 Report modem data pump and internal code revision.
L*n*	Modem Speaker Volume
	L0 OFF or low volume.
	* L1 Low volume.
	L2 Medium volume.
	L3 High volume.

Command	Function/Options
M*n*	Modem Speaker Control M0 Disable Modem Speaker. * M1 Speaker ON until carrier is detected. M2 Speaker always ON. M3 Speaker ON after dial, until connection is established.
N*n*	Enable/Disable Automode N0 Disable automode detection (equivalent to setting the +MS<automode> subparameter to 0). A subsequent handshake will be conducted as specified by register S37, or if S37=0, according to the most recently sensed DTE speed. * N1 Enable automode detection (equivalent to setting +MS<automode> subparameters to 1). A subsequent handshake will be conducted as specified by register S37, or if S37=0, starting at 28,800 bps V.34.

Notes:

- The N*n* and S37=*x* commands override the +MS command settings. When the N0 or N1 command is issued, the +MS subparameters are updated accordingly. For example, "N1S37=10" updates the +MS command subparameters to reflect "+MS=10,1,300,12000"; while "N0S37=10" updates the +MS command subparameters to "+MS=10,0,300,12000".
- It is recommended to use the +MS commands instead of the Nn and S37=*x* commands.
- N*n* and S37=*x* commands are supported for compatibility with existing communication software.

O*n*	Return to On-Line Mode. O0 Switches modem from command mode to on-line mode after dropping to command mode using the escape sequence (+++). O1 Switches from command mode to on-line mode and initiates an equalizer retrain sequence before returning to on-line mode.
P	Set Pulse Dial as Default. Forces pulse dialing until the next T dial modifier or T command is received.
Q*n*	Enable/Disable Result Codes Q0 Enable result codes. * Q1 Disable result codes (quiet mode).
S*r*=*n*	Set Register *r* to Value *n*. See list of S-Registers in Section 10.
S*r*?	Display Current Value of Register *r*.
T	Sets Tone Dial as Default. Forces tone dialing until the next P dial modifier or P command is received.

Command	Function/Options
V*n*	Result Code Format. * V0 Numeric format. V1 Verbal format.
W*n*	Error Correction Message Control. * W0 Upon connection, modem reports DTE speed only. W1 Upon connection, modem reports line speed, error correction protocol, and DTE speed. W2 Upon connection, modem reports DCE speed.
X*n*	Extended Result Codes. X0 Disables monitoring of busy tones unless forced by country requirements; sends only OK, CONNECT, RING, NO CARRIER, ERROR, and NO ANSWER result codes. X1 Disables monitoring of busy tones unless forced by country requirements; sends only OK, CONNECT, RING, NO CARRIER, ERROR, NO ANSWER, and CONNECT XXXX result codes. X2 Disables monitoring of busy tones unless forced by country requirements; sends only OK, CONNECT, RING, NO CARRIER, ERROR, DIAL TONE, NO ANSWER, and CONNECT XXXX result codes. X3 Enables monitoring of busy tones; sends only OK, CONNECT, RING, NO CARRIER, ERROR, NO DIALTONE, NO ANSWER, and CONNECT XXXX result codes. * X4 Enables monitoring of busy tones and sends all messages.
Y*n*	Enable/Disable Long Space Disconnect. * Y0 Disable long space disconnect. Y1 Enable long space connect.
Z*n*	Soft Reset and Restore Profile. * Z0 Restores stored profile 0. Z1 Restores stored profile 1.
+++	Escape Sequence. Switches from on-line mode to command mode while preserving the connection with the on-line modem.
&C*n*	Controls Data Carrier Detect (DCD) Signal. &C0 Forces DCD signal to be ON at all times. * &C1 Normal DCD operation (required by most software).

Command	Function/Options
&D*n*	Control Data Terminal Ready (DTR) Signal. Interprets the ON to OFF transition of the DTR signal from the DTE as specified by the &Qn setting. &D0 &Q0,5,6: DTR ignored. &Q1,4: Modem hangs up; auto answer not effected. &Q2,3: Modem hangs up; auto answer inhibited &D1 &Q0,1,4-6: Asynchronous escape sequence. &Q2,3: Modem hangs up; auto answer inhibited. * &D2 &Q0-6: Modem hangs up; auto answer inhibited. &D3 &Q0,1,4-6: Modem performs soft reset as if the ATZ command were received. &Q2,3: Modem hangs up; auto answer inhibited.
&F*n*	Load Factory Defaults. Instructs the modem to load the factory set parameters (non-programmable). &F0 Load factory defaults 0. &F1 Load factory defaults 1.
&G*n*	Select Guard Tone. * &G0 Disable guard tone. &G1 Disable guard tone. &G2 Select 1800 Hz guard tone.
&J*n*	Telephone Jack Control. * &J0 No Function. Included for compatibility. &J1 No Function. Included for compatibility.
&K*n*	DTE/Modem Flow Control. &K0 Disable flow control. * &K3 Enable RTS/CTS. &K4 Enable XON/XOFF. &K5 Enable transparent XON/XOFF. &K6 Enable both RTS/CTS and XON/XOFF
&P*n*	Select Pulse Dial Make/Break Ratio. * &P0 USA/Canada ratio (39/61 at 10 pps). &P1 UK/Hong Kong ratio (33/67 at 10 pps). &P2 Same as &P0, except at 20 pps. &P3 Same as &P1, except at 20 pps.
&Q*n*	Asynchronous Mode &Q0 Direct Asynchronous Mode. All Error Correction and Compression protocols are disabled. This requires that the software's baud rate matches modem baud rate. * &Q5 Modem negotiates an error correction link. &Q6 Selects asynchronous operation in normal mode. (Speed buffering allows software baud rate to be fixed).

Command	Function/Options
&R*n*	RTS/CTS Option. &R0 In sync mode, CTS tracks the state of the RTS signal; the RTS-to-CTS delay is defined by register S26. In async mode, the CTS signal acts according to V.25bis handshake. * &R1 In sync mode, CTS is always ON (RTS transition is ignored). In async mode, CTS will only drop if required by flow control.
&S*n*	Data Set Ready (DSR) Signal. * &S0 DSR override; always ON. &S1 DSR signal ON after answer tone is detected, and OFF after the carrier is lost.
&T*n*	Test and Diagnostics. Modem will perform selected test and diagnostic function. Note that Tests can only be run in asynchronous mode, with error correction disabled. &T0 Terminate test in progress. &T1 Execute local Analog Loopback Test. &T3 Execute Local Digital Loopback Test. &T4 Enable modem to accept remote request for Digital Loopback Test. * &T5 Deny remote request for Digital Loopback Test. &T6 Execute remote Digital Loopback Test. &T7 Execute remote Digital Loopback Test with self test. &T8 Execute remote Analog Loopback Test with self test.
&V	View Current Configuration. Displays the active profile, stored profiles, and stored phone numbers.
&W*n*	Store User Profile. Saves the current configuration in NVRAM. &W0 Save as User Profile 0. &W1 Save as User Profile 1.
&Y*n*	Select Default User Profile * &Y0 Select User Profile 0. &Y1 Select User Profile 1.
&Z=*n*	Store Phone Number to NVRAM (36 digit dial string). &Z=0 Store phone number at position 0. &Z=1 Store phone number at position 1. &Z=2 Store phone number at position 2. &Z=3 Store phone number at position 3.

5. S-Registers

The S-Registers are used to store modem configuration parameters, display modem status, and initiate modem test and diagnostic functions. In order to invoke commands to change or display the contents of the S-Registers, you must first access the modem command mode as described in Section 9.1 in the SRM-100 User's Guide. Note the following:

- **View Status Screen:** To display the modem status screen (Figure 9.1), which lists the current values assigned to most S-Registers, type **`AT&V`** and press **[Enter]**.
- **View S-Register Value:** To display the value currently assigned to a specific S-Register, type **`ATS`*r*`?`** and press **[Enter]** (Where ***r*** is the desired S-Register).
- **Change S-Register Value:** To change the value assigned to an S-Register, type **`ATS`*r*`=`*n*** and press **[Enter]** (Where ***r*** is the desired S-Register, and ***n*** is the desired value).
- **Bit Mapped Registers:** Some registers control more than one function. If you wish to enable several of these functions, add up the decimal values of the desired functions, and enter the total as the value of the S-Register.

Register	Range	Default	Function
S00	0 - 255	1	Auto Answer. Sets the number of rings on which to answer in Auto Answer Mode. When set to 0, Auto Answer is disabled.
S01	0 - 255	0	Ring Count. Counts and stores the number of rings from an incoming call. This value is cleared if a ring is not detected over an 8 second period. If the value of register S1 equals the value of register S0, the modem will answer the phone.
S02	0 - 127	43	Escape Character Code. Stores the ASCII decimal code for the escape code character. The default character is + (043).
S03	0 - 127	13	Carriage Return Character. Stores the ASCII code for the Carriage Return character. The default value is 013 (normal carriage return).
S04	0 - 127	10	Line Feed Character. Stores the ASCII decimal code for the Line Feed character. The default value is 010 (normal line feed).
S05	0 - 032	8	Backspace Character. Stores the ASCII decimal code for the Backspace character. The default value is 008 (normal backspace character).
S06	2 - 255	2	Wait for Dial Tone. Sets the number of seconds the modem will wait between going off-hook and beginning dialing.
S07	0 - 255	50	Wait for Carrier. Sets the number of seconds the modem will wait for a carrier signal from a remote modem. If a carrier is not received, the modem will hang-up and send the NO CARRIER message. Often used to select a longer duration when the modem is originating an international connection.
S08	0 - 255	2	Pause Time for Carrier. Sets the duration (in seconds) for the Dial command pause option (,).

<table>
<tr><th>Register</th><th>Range</th><th>Default</th><th>Function</th></tr>
<tr><td>S09</td><td>1 - 225</td><td>6</td><td>Carrier Detect Response Time. Determines the length of time (in tenths of a second) required for the modem to recognize the receive character from the remote modem, and turn on the DCD.</td></tr>
<tr><td>S10</td><td>1 - 255</td><td>14</td><td>Lost Carrier to Hang-Up Delay. Sets the length of time (in tenths of a second) the modem will wait after loss of carrier before hanging up. If this value is set lower than the value contained in S09, a loss of carrier will always result in disconnection.</td></tr>
<tr><td>S11</td><td>50 - 255</td><td>95</td><td>Duration / Spacing DTMF. Sets the duration and spacing (in milliseconds) between DTMF (touch tone) dialing characters.</td></tr>
<tr><td>S12</td><td>0 - 255</td><td>50</td><td>Escape Prompt Delay (EDP). Defines the maximum period (in fiftieths of a second), allowed between receipt of the last character in the escape code (+++), from the DTE and sending of the OK result code to DTE. If any characters are detected during this time, the OK will not be sent.</td></tr>
<tr><td>S13</td><td>---</td><td>---</td><td>Not Used.</td></tr>
<tr><td>S14</td><td>---</td><td>---</td><td>Bit Mapped Options.
<table>
<tr><th>Bit</th><th>Option</th><th>Val</th><th>Descrip</th><th>Cmd</th></tr>
<tr><td>0</td><td>Used Internally</td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>Command Echo</td><td>0</td><td>Disabled</td><td>E0</td></tr>
<tr><td></td><td></td><td>1</td><td>Enabled</td><td>E1</td></tr>
<tr><td>2</td><td>Result Codes</td><td>0</td><td>Enabled</td><td>Q0</td></tr>
<tr><td></td><td></td><td>1</td><td>Disabled</td><td>Q1</td></tr>
<tr><td>3</td><td>Result Code Type</td><td>0</td><td>Numeric</td><td>V0</td></tr>
<tr><td></td><td></td><td>1</td><td>Verbal</td><td>V1</td></tr>
<tr><td>4</td><td>Used Internally</td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>Dial Method</td><td>0</td><td>Tone</td><td>T</td></tr>
<tr><td></td><td></td><td>1</td><td>Pulse</td><td>P</td></tr>
<tr><td>6</td><td>Used Internally</td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>Originate/Answer</td><td>0</td><td>Answer</td><td>A</td></tr>
<tr><td></td><td></td><td>1</td><td>Originate</td><td>D</td></tr>
</table></td></tr>
<tr><td>S15</td><td>---</td><td>---</td><td>Not Used</td></tr>
<tr><td>S16</td><td>---</td><td>---</td><td>Modem Test Options.
<table>
<tr><th>Bit</th><th>Option</th><th>Val</th><th>Descrip</th><th>Cmd</th></tr>
<tr><td>0</td><td>Local Analog Loopback</td><td>0</td><td>Disabled</td><td></td></tr>
<tr><td></td><td></td><td>1</td><td>Enabled</td><td>&T1</td></tr>
<tr><td>1</td><td>Not Used</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Local Digital Loopback</td><td>0</td><td>Disabled</td><td></td></tr>
<tr><td></td><td></td><td>1</td><td>Enabled</td><td>&T3</td></tr>
<tr><td>3</td><td>Status Bit</td><td>0</td><td>Loopback Off</td><td></td></tr>
<tr><td></td><td></td><td>1</td><td>In Progress</td><td></td></tr>
<tr><td>4</td><td>Initiate Remote</td><td>0</td><td>Disabled</td><td></td></tr>
<tr><td></td><td>Digital Loopback</td><td>1</td><td>Enabled</td><td>&T6</td></tr>
<tr><td>5</td><td>Remote Digital Loopback</td><td>0</td><td>Disabled</td><td></td></tr>
<tr><td></td><td>With Error Count</td><td>1</td><td>Enabled</td><td>&T7</td></tr>
<tr><td>6</td><td>Local Analog Loopback</td><td>0</td><td>Disabled</td><td></td></tr>
<tr><td></td><td>With Self Test</td><td>1</td><td>Enabled</td><td>&T8</td></tr>
<tr><td>7</td><td>Not Used</td><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Register</th><th>Range</th><th>Default</th><th>Function</th></tr>
<tr><td>S17</td><td>---</td><td>---</td><td>Not Used.</td></tr>
<tr><td>S18</td><td>0 - 255</td><td>0</td><td>Test Timer. Test timer for &Tn loopback testing. Sets the length of time (in seconds) the modem will wait before automatically timing out and terminating the test. When set to 0, the timer is disabled, and the test must be terminated by issuing an &T0 or H command.</td></tr>
<tr><td>S19</td><td>---</td><td>---</td><td>Not Used.</td></tr>
<tr><td>S20</td><td>---</td><td>---</td><td>Not Used.</td></tr>
<tr><td>S21</td><td>---</td><td>---</td><td>Bit Mapped Options.
<table>
<tr><th>Bit</th><th>Option</th><th>Val</th><th>Descrip</th><th>Cmd</th></tr>
<tr><td>0</td><td>Telephone Jack</td><td>0</td><td>RJ11</td><td>&J0</td></tr>
<tr><td></td><td></td><td>1</td><td>RJ12</td><td>&J1</td></tr>
<tr><td>1</td><td>Not Used</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>RTS/CTS</td><td>0</td><td>CTS/RTS</td><td>&R0</td></tr>
<tr><td></td><td></td><td>1</td><td>CTS always true</td><td>&R1</td></tr>
<tr><td>3,4</td><td>DTR</td><td>0</td><td>Ignore DTR</td><td>&D0</td></tr>
<tr><td></td><td></td><td>1</td><td>Modem to Cmd. State on On-to-Off DTR transition.</td><td>&D1</td></tr>
<tr><td></td><td></td><td>2</td><td>Modem hangs-up on On-to-Off DTR transition.</td><td>&D2</td></tr>
<tr><td></td><td></td><td>3</td><td>Init. state on On-to-Off DTR transition.</td><td>&D3</td></tr>
<tr><td>5</td><td>DCD</td><td>0</td><td>Always On</td><td>&C0</td></tr>
<tr><td></td><td></td><td>1</td><td>Follows Carrier</td><td>&C1</td></tr>
<tr><td>6</td><td>Not Used</td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>Long Space Disconnect</td><td>0</td><td>Disabled</td><td>Y0</td></tr>
<tr><td></td><td></td><td>1</td><td>Enabled</td><td>Y1</td></tr>
</table></td></tr>
<tr><td>S22</td><td>---</td><td>---</td><td>Bit Mapped Options
<table>
<tr><th>Bit</th><th>Option</th><th>Val</th><th>Descrip</th><th>Cmd</th></tr>
<tr><td>0,1</td><td>Speaker Volume</td><td>0</td><td>Low</td><td>L0</td></tr>
<tr><td></td><td></td><td>1</td><td>Low</td><td>L1</td></tr>
<tr><td></td><td></td><td>2</td><td>Medium</td><td>L2</td></tr>
<tr><td></td><td></td><td>3</td><td>High</td><td>L3</td></tr>
<tr><td>2,3</td><td>Speaker Control</td><td>0</td><td>Speaker Off</td><td>M0</td></tr>
<tr><td></td><td></td><td>1</td><td>On until carrier detected</td><td>M1</td></tr>
<tr><td></td><td></td><td>2</td><td>Always On</td><td>M2</td></tr>
<tr><td></td><td></td><td>3</td><td>On until carrier detected, but Off while dialing</td><td>M3</td></tr>
<tr><td>4-6</td><td>Result Codes</td><td>0</td><td>See X0</td><td>X0</td></tr>
<tr><td></td><td></td><td>4</td><td>See X1</td><td>X1</td></tr>
<tr><td></td><td></td><td>5</td><td>See X2</td><td>X2</td></tr>
<tr><td></td><td></td><td>6</td><td>See X3</td><td>X3</td></tr>
<tr><td></td><td></td><td>7</td><td>See X4</td><td>X4</td></tr>
<tr><td>7</td><td>Make/Break Ratio</td><td>0</td><td>39:61 (USA)</td><td>&P0</td></tr>
<tr><td></td><td></td><td>1</td><td>33:67 (UK)</td><td>&P1</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Register</th><th>Range</th><th>Default</th><th>Function</th></tr>
<tr><td>S23</td><td>---</td><td>---</td><td>Bit Mapped Options.
<table>
<tr><th>Bit</th><th>Option</th><th>Val</th><th>Descrip</th><th>Cmd</th></tr>
<tr><td>0</td><td>Obey request from remote modem for remote digital loopback test</td><td>0</td><td>Disabled</td><td>&T5</td></tr>
<tr><td></td><td></td><td>1</td><td>Enabled</td><td>&T4</td></tr>
<tr><td>1-3</td><td>Assumed DTE Rate</td><td>0</td><td>300 bps</td><td></td></tr>
<tr><td></td><td></td><td>1</td><td>600 bps</td><td></td></tr>
<tr><td></td><td></td><td>2</td><td>1200 bps</td><td></td></tr>
<tr><td></td><td></td><td>3</td><td>2400 bps</td><td></td></tr>
<tr><td></td><td></td><td>4</td><td>4800 bps</td><td></td></tr>
<tr><td></td><td></td><td>5</td><td>9600 bps</td><td></td></tr>
<tr><td></td><td></td><td>6</td><td>19.2K bps</td><td></td></tr>
<tr><td>4,5</td><td>Parity Option</td><td>0</td><td>Even</td><td></td></tr>
<tr><td></td><td></td><td>1</td><td>Space</td><td></td></tr>
<tr><td></td><td></td><td>2</td><td>Odd</td><td></td></tr>
<tr><td></td><td></td><td>3</td><td>Mark</td><td></td></tr>
<tr><td>6,7</td><td>Guard Tones</td><td>0</td><td>Disabled</td><td>&G0</td></tr>
<tr><td></td><td></td><td>1</td><td>550 Hz</td><td>&G1</td></tr>
<tr><td></td><td></td><td>2</td><td>1800 Hz</td><td>&G2</td></tr>
</table></td></tr>
<tr><td>S24</td><td>---</td><td>---</td><td>Not Used.</td></tr>
<tr><td>S25</td><td>0 - 255</td><td>5</td><td>Async DTR Delay. Sets the duration (in hundredths of a second) that DTR must be dropped in order to be interpreted as a DTR loss. Allows the modem to differentiate between a random glitch and a true DTR loss.

In most cases, the default value can be used. The S25 register is useful for setting compatibility with older systems running under older operating software.</td></tr>
<tr><td>S26</td><td>0 - 255</td><td>1</td><td>Sync RTS/CTS Delay. The modem will ignore a change in RTS/CTS status for the time interval (in hundredths of a second) defined in this register, when in the synchronous mode.</td></tr>
<tr><td>S27</td><td>---</td><td>---</td><td>Bit Mapped Options.
<table>
<tr><th>Bit</th><th>Option</th><th>Bits</th><th>Descrip</th><th>Cmd</th></tr>
<tr><td>0,1,3</td><td>Operation Mode</td><td>0 1 3</td><td></td><td></td></tr>
<tr><td></td><td></td><td>0 0 0</td><td>See &Q0</td><td>&M0 or &Q0</td></tr>
<tr><td></td><td></td><td>0 0 1</td><td>See &Q1</td><td>&M1 or &Q1</td></tr>
<tr><td></td><td></td><td>0 1 0</td><td>See &Q2</td><td>&M2 or &Q2</td></tr>
<tr><td></td><td></td><td>0 1 1</td><td>See &Q3</td><td>&M3 or &Q3</td></tr>
<tr><td></td><td></td><td>1 0 0</td><td>See &Q4</td><td>&Q4</td></tr>
<tr><td></td><td></td><td>1 0 1</td><td>See &Q5</td><td>&Q5</td></tr>
<tr><td></td><td></td><td>1 1 0</td><td>See &Q6</td><td>&Q6</td></tr>
<tr><td>2</td><td>Line Type</td><td>0</td><td>Dial Up</td><td>&L0</td></tr>
<tr><td></td><td></td><td>1</td><td>Leased Line</td><td>&L1</td></tr>
<tr><td>4,5</td><td>Transmit Clock</td><td>0</td><td>Internal</td><td>&X0</td></tr>
<tr><td></td><td></td><td>1</td><td>External</td><td>&X1</td></tr>
<tr><td></td><td></td><td>2</td><td>Slave</td><td>&X2</td></tr>
<tr><td>6</td><td>Service Type</td><td>0</td><td>CCITT</td><td>B0</td></tr>
<tr><td></td><td></td><td>1</td><td>Bell 212A</td><td>B1</td></tr>
<tr><td>7</td><td>Not Used.</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>S28</td><td>---</td><td>---</td><td>Not Used.</td></tr>
</table>

<table>
<tr><th>Register</th><th>Range</th><th>Default</th><th>Function</th></tr>
<tr><td>S29</td><td>0 - 255</td><td>---</td><td>Flash Dial Modifier Time. Sets the length of time (in hundredths of a second) that the modem will go off-hook when it encounters the flash (!) dial modifier in the dial string.</td></tr>
<tr><td>S30</td><td>0 - 255</td><td>---</td><td>Disconnect Inactivity Timer. Sets the length of time (in 10 second intervals) that the modem will stay on-line before disconnecting when no data is sent or received. In error-correction mode, any data transmitted or received will reset the timer. In other modes, any data transmitted will reset the timer. The timer is inoperative in synchronous mode.</td></tr>
<tr><td>S31</td><td>---</td><td>---</td><td>Bit Mapped Options.
<u>Bit</u> <u>Option</u> <u>Val</u> <u>Description</u> <u>Cmd</u>
0 Not Used
1 Speed Detection 0 Disabled N0
1 Enabled N1
2,3 Progress Messages 0 DTE Speed W0
1 Full Reporting W1
2 DCE Speed W2
4-7 Not Used.</td></tr>
<tr><td>S32</td><td>0 - 255</td><td>17</td><td>XON Character. Stores the ASCII decimal code for the XON character.</td></tr>
<tr><td>S33</td><td>0 - 255</td><td>19</td><td>XOFF Character. Stores the ASCII decimal code for the XOFF character.</td></tr>
<tr><td>S36</td><td>0 - 7</td><td>7</td><td>V.42 Negotiation Failure Treatment. This register is read when the S48 register equals 128 or if an attempted V.42 connection fails. These fallback options are initiated immediately upon connection if S48 = 128.
S36=0 Modem Disconnects.
S36=1 Modem stays on-line and a direct mode connection is established.
S36=2 Reserved.
S36=3 Modem stays on-line and a normal mode connection is established.
S36=4 An MNP connection is attempted. If this connection fails, the modem then disconnects.
S36=5 An MNP connection is attempted. If this connection fails, a direct mode connection is established.
S36=6 Reserved.
S36=7 An MNP connection is attempted. If this connection fails, a normal mode connection is established.</td></tr>
<tr><td>S37</td><td>0 - 21</td><td>0</td><td>Desired Connection Rate.
S37=0 Attempt auto mode connection.
S37=1-3 Attempt to connect at 300 bps.
S37=4 Reserved.
S37=5 Attempt to connect at 1200 bps.
S37=6 Attempt to connect at 2400 bps.
S37=7 Attempt to connect at V.23
S37=8 Attempt to connect at 4800 bps.
S37=9 Attempt to connect at 9600 bps.
S37=10 Attempt to connect at 12K bps.
S37=11 Attempt to connect at 14.4K bps.
S37=12 Attempt to connect at 7200 bps.</td></tr>
</table>

Register	Range	Default	Function
S38	0 - 255	20	Delay Before Forced Hang Up. This register specifies the delay (in seconds) between the modem's receipt of the H command to disconnect (or On-to-Off transition of DTR if the modem is set to follow the signal), and the disconnect operation. Applicable to error correction connection only. This register can be used to ensure that data in the modem buffer is sent before the modem disconnects.
S39	---	---	Bit Mapped Register.
S40	---	---	Bit Mapped Register.
S41	---	---	Bit Mapped Register.
S46	136 or 138	138	Protocol Selection. This register controls V.42bis compression. S46=136 Disable V.42bis compression. S46=138 Enable V.42bis compression.
S48	0, 7 or 128	7	V.42 Negotiation Action. The V.42 negotiation process determines the capabilities of the remote modem. Note that this process is bypassed when the capabilities of the remote modem are known and negotiation is unnecessary. S48=0 Disables negotiation. Bypasses the detection and negotiation phases, and proceeds with V.42 (LAPM). S48=7 Enables negotiation. S48=128 Disables negotiation. Bypasses the detection and negotiation phases, and proceeds with the fallback action specified by register S36. Can be used to force MNP.
S82	---	---	S82 is included for compatibility purposes only. Changing this register will have no effect.
S86	0, 4, 5, 8, 12, 13, or 14	---	Connection Failure Cause Code. When the modem issues a NO CARRIER result code, a value is written to this S register to help determine the reason for the failed connection. S86 records the first event that contributes to a NO CARRIER message. S86=0 Normal Disconnect, no error occurred. S86=4 Loss of carrier. S86=5 V.42 negotiation failed to detect an error correcting modem at the other end. S86=9 The modems could not find a common protocol. S86=12 Normal disconnect initiated by the remote modem. S86=13 Remote modem does not respond after 10 re-transmissions of the same message. S86=14 Protocol violation.

<table>
<tr><th>Register</th><th>Range</th><th>Default</th><th>Function</th></tr>
<tr><td>S95</td><td>---</td><td>000</td><td>Extended Result Codes. The bits in this register can be set to override some of the Wn command options. A bit set to 1 in this register will enable the corresponding result code regardless of the
Wn setting.

<u>Bit</u> <u>Dec Value</u> <u>Function</u>
0 = 1 CONNECT CODE indicates DCE speed instead of DTE speed.
1 = 2 Append /ARQ (Automatic Repeat Request) to verbose CONNECT XXXX result code if protocol is other than none.
2 = 4 Enable CARRIER XXX result code.
3 = 8 Enable PROTOCOL XXXX result code.
5 = 32 Enable COMPRESSION result code.

Note: To enable more than one function, add up the decimal values of the desired functions. For example, to enable CARRIER, PROTOCOL, and COMPRESSION, you would add 32 + 8 + 4 for a total of 44. Therefore, the command to enable these functions would be ATS95=44.</td></tr>
</table>

6. Modem Result Codes

When AT commands are invoked, the modem will respond with either Terse (numeric) or Verbose (text) result codes. The result code format is set using the Modem Parameters Menu (/M), or the ATV*n* command. Result Codes can also be completely suppressed by enabling the Quiet Mode via the Modem Parameters Menu or the ATQ*n* command.

Notes:

- The CARRIER Result Code must be enabled using S95 bit 2 or the ATW1 command.
- The COMPRESSION Result Code must be enabled using S95 bit 5.
- The PROTOCOL Result Code must be enabled using S95 bit 3 or the ATW1 command.

Verbose Response	Terse Response	Description
OK	0	Modem Successfully executed a command.
CONNECT	1	Connection made at 300 bps.
RING	2	Modem detected an incoming call.
NO CARRIER	3	Modem lost or could not detect a remote carrier signal within the Register S7 time.
ERROR	4	Modem found an error in the command line.
CONNECT 1200	5	Connection made at 1200 bps.
NO DIALTONE	6	Modem did not detect a dial tone within 5 seconds after going off-hook.
BUSY	7	Modem detected a busy signal.
NO ANSWER	8	Five seconds of silence was not detected when using the @ command in the ATD command.
CONNECT 0600	9	Connection made at 600 bps.
CONNECT 2400	10	Connection made at 2400 bps.
CONNECT 4800	11	Connection made at 4800 bps.
CONNECT 9600	12	Connection made at 9600 bps.
CONNECT 7200	13	Connection made at 7200 bps.
CONNECT 12000	14	Connection made at 12000 bps.
CONNECT 14400	15	Connection made at 14400 bps.
CONNECT 16800	59	Connection made at 16800 bps.

Verbose Response	Terse Response	Description
CONNECT 19200	16	Connection made at 19200 bps. (If modem is set to respond with connect message that indicates carrier rate, otherwise indicates software rate).
CONNECT 21600	61	Connection made at 21600 bps.
CONNECT 24000	62	Connection made at 24000 bps.
CONNECT 26400	63	Connection made at 26400 bps.
CONNECT 28800	64	Connection made at 28800 bps.
CONNECT 38400	17	Connection made at 38400 bps. (Indicates software rate).
CONNECT 57600	18	Connection made at 57600 bps. (Indicates software rate).
CONNECT 115200	19	Connection made at 115200 bps. (Indicates software rate).
FAX	33	Fax Detected. (Fax/Data answer mode).
DATA	35	Modem detected. (Fax/Data answer mode).
CARRIER 300	40	Carrier rate of 300 bps.
CARRIER 1200	46	Carrier rate of 1200 bps.
CARRIER 2400	47	Carrier rate of 2400 bps.
CARRIER 4800	48	Carrier rate of 4800 bps.
CARRIER 7200	49	Carrier rate of 7200 bps.
CARRIER 9600	50	Carrier rate of 9600 bps.
CARRIER 12000	51	Carrier rate of 12000 bps.
CARRIER 14400	52	Carrier rate of 14400 bps.
CARRIER 16800	53	Carrier rate of 16800 bps.
CARRIER 19200	54	Carrier rate of 19200 bps.
CARRIER 21600	55	Carrier rate of 21600 bps.
CARRIER 24000	56	Carrier rate of 24000 bps.
CARRIER 26400	57	Carrier rate of 26400 bps.
CARRIER 28800	58	Carrier rate of 28800 bps.
COMPRESSION: CLASS 5	66	The modem has connected in MNP class 5 and COMPRESSION message reporting has been enabled.
COMPRESSION: V.42BIS	67	The modem has connected in V.42bis and COMPRESSION message reporting has been enabled.

Verbose Response	Terse Response	Description
COMPRESSION: NONE	69	The modem has connected without data compression and COMPRESSION message reporting has been enabled.
PROTOCOL: NONE	76	The modem has connected without any form of error correction. (NO MNP4 or V.42).
PROTOCOL: LAPM	77	The modem has connected in the V.42 LAPM mode of error correction.
PROTOCOL: ALT	80	The modem has connected in the MNP4 mode of error correction.

Customer Service

Customer Service hours are from 8:00 AM to 5:00 PM, PST, Monday through Friday. When calling, please be prepared to give the name and make of the unit, its serial number and a description of its symptoms. If the unit should need to be returned for factory repair it must be accompanied by a Return Authorization number from Customer Service.

WTI Customer Service
5 Sterling
Irvine, California 92618

Local Phone: (949) 586-9950
Toll Free Service Line: 1-888-280-7227
Service Fax: (949) 457-8138

Email: service@www.wti.com

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